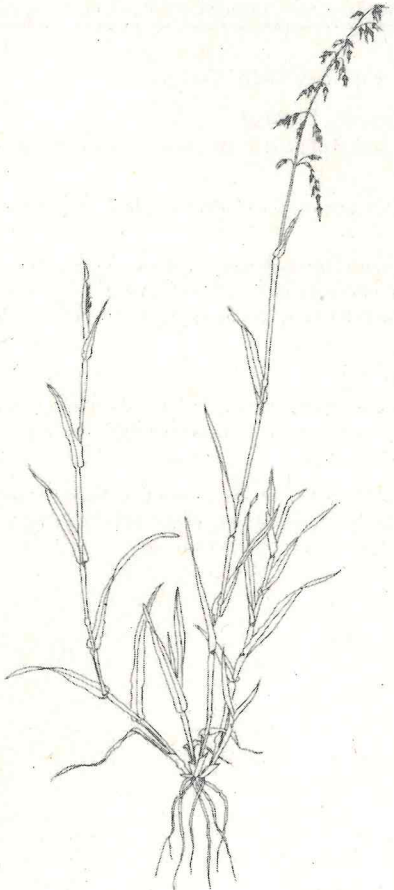


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MANAGING WEEDS IN BUSHLAND



Veldgrass (*Ehrharta calycina*)

THE PERENNIAL TUSSOCK FORMING GRASS WEEDS



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Getting Involved - The Environmental Weeds Action Network:

The Environmental Weeds Action Network (EWAN) is a community initiative to tackle the problem of environmental weeds in bushland and waterways. It brings together community members in both urban and rural areas, bush regenerators, local government, weed scientists and ecologists to save our indigenous flora from the threat of weeds.

The aims of EWAN include:

- promoting an understanding of the threat of environmental weeds to our precious bushland.
- providing useful information about weed control in native vegetation and elsewhere.
- convincing governments at all levels of the need for appropriate legislation and funding for weed control.
- researching methods of weed control.
- encouraging community participation.

Telephone (08) 9457 2896 or visit our web site at:
www.members.iinet.net.au/~ewan/

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Tambookie Grass illustration reproduced from Memoirs of the Botanical Survey of South Africa No. 58: 339, with the kind permission of the South African National Biodiversity Institute, South Africa. All other illustrations by Libby Sandiford.

Compiled by Kate Brown and Grazyna Paczkowska (CALM) 2005.

Urban Nature

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Grass Weeds in Western Australia

Almost one third of the 709 grass species recorded in Western Australia have been introduced from other countries, mainly for agricultural purposes. Today these introduced grasses are seriously impacting on the nature conservation values of bushlands across south-western Australia.

What are perennial tussock forming grasses?

Reproducing by seed and/or tillers (basal branches of grasses) perennial tussock forming grasses are perennial grasses that form dense, usually erect, clumps. They do not spread via rhizomes (below ground stems that roots and shoots at nodes) or stolons (stems that run along the soil surface). As clumps age, each year's old leaf material and flowering stems accumulate, creating large fuel loads. This group of grasses makes up one of the most serious groups of environmental weeds, mostly from southern Africa, include Perennial Veldgrass (*Ehrharta calycina*), Tambookie Grass or Coolatai Grass (*Hyparrhenia hirta*) and Love Grass (*Eragrostis curvula*).

Fire and the spread of perennial tussock forming grasses in Bushland

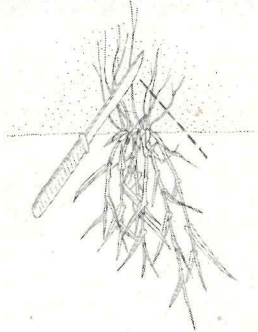
- Many grasses, especially tussock forming species, have long narrow vertical leaves that are efficient in strong light allowing sunlight to penetrate deep inside the clump. This structure allows the production of a large biomass in a small space.
- Stems and leaves die each year and new ones develop.
- Over time the dead material accumulates and creates a significant fire hazard. Grass weed invasion then changes the fire frequency and intensity in a particular bushland patch.
- These changes are self-perpetuating, as the disturbance caused by fire tends to promote flowering and then germination and establishment of seedling grasses.
- Post-fire increases in nutrients, light and space availability are then effectively exploited by invasive grasses leading to the exclusion of native flora.

Grass invasion within the bushland following fire will increase dramatically if there is no intensive control program. Following unplanned fire resources should be allocated for controlling weed grass seedlings and resprouting tussocks.

How do these Grass Weeds Spread?

Seed is important for the spread and establishment of many perennial grasses. An understanding of seed dispersal mechanisms allows us to limit further spread and re-infestation.

- ❖ Wind plays a central role in dispersal and many grasses occupy open habitats subject to frequent winds.
- ❖ Water can disperse large numbers of seeds. The light weight of many seeds allows them to float easily. Upstream and uphill source populations need to be managed. Drain outlets can have sumps incorporated to allow weed seed to settle and collect.



Control techniques:

➤ Handweed small populations in good condition bushland by using a knife to cut through the roots below the crown tissue. Minimise soil disturbance as much as possible. Care must be taken to remove all dormant buds at the base.

Management and Control

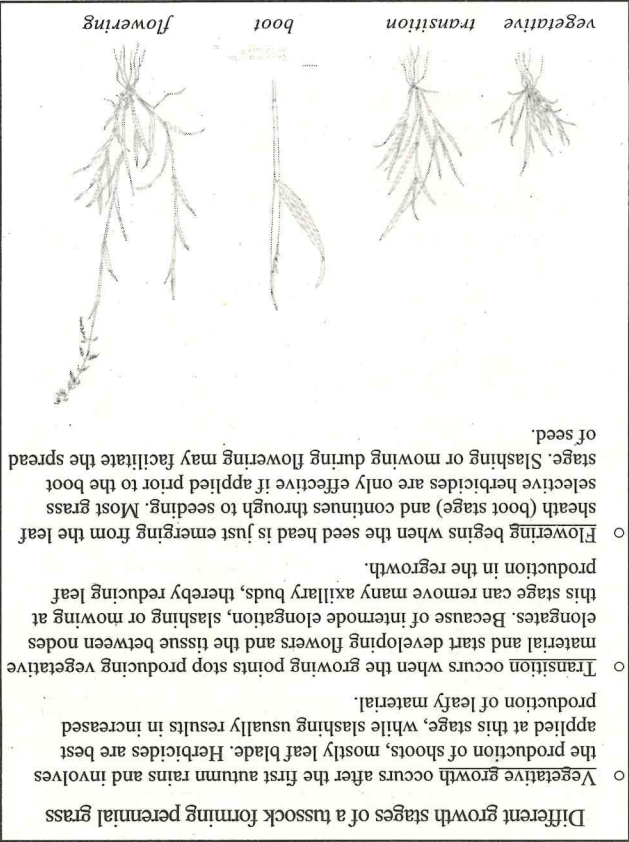
- They can change intensity, seasonality patchiness and frequency of fires in bushland impacting on the canopy structure and on the diversity of flora and fauna.
- The grasses form large dense clumps that suppress and displace native flora particularly native herbs and grasses.
- These grasses form large dense clumps that suppress and displace native flora particularly native herbs and grasses.

Impacts of perennial tussock forming grasses

- ❖ Animals can carry grass seeds on their skin and fur. Dogs, horses often carry grass weed seed.
- ❖ Humans activities, including inappropriate management practices, provide mechanisms for grass weed dispersal. Grading drags seed (and tillers) along road verges and slashing during flowering spreads seed. Road building material including soil and gravel tracks. Horses can spread grass weeds from paddocks into bushland, depositing seed with their manure. Many management plans suggest dogs and horses should be kept out of bushland.

- Slashing before seed set and ensuring machinery involved in roadside maintenance is cleaned down to remove grass material and seed before moving into uninfested areas.
- Obtaining road building material from a weed free source.
- Maintaining the bushland canopy. Many grasses prefer open sunny sites and do not establish or compete successfully in the shade.
- Reducing the potential for bushfires. As mentioned, fire can significantly increase the establishment and spread of grass weeds. Identifying unfamiliar grasses. It is important to determine if grasses are introduced or native. Early identification of grass weeds allows you to assess the likelihood of invasion and prevents mistaken eradication of native grasses!

➤ Handweed small populations in good condition bushland by using a knife to cut through the roots below the crown tissue. Minimise soil disturbance as much as possible. Care must be taken to remove all dormant buds at the base.



- Different growth stages of a tussock forming perennial grass
- Vegetative growth occurs after the first autumn rains and involves the production of leafy material. Herbicides are best applied at this stage, while slashing usually results in increased production of leafy material.
- Transition occurs when the growing points stop producing vegetative material and start developing flowers and the tissue between nodes elongates. Because of internode elongation, slashing or mowing at this stage can remove many axillary buds, thereby reducing leaf production in the regrowth.
- Flowering begins when the seed head is just emerging from the leaf sheath (boot stage) and continues through to seeding. Most grass selective herbicides are only effective if applied prior to the boot stage. Slashing or mowing during flowering may facilitate the spread of seed.

- Spot spraying with a grass selective herbicide controls many tussock forming perennial grasses. These herbicides are highly selective for susceptible grasses and have little impact on most other monococts or dicots in *Banksia* woodland on the Swan Coastal Plain. Fusilade® (applied at 10 ml/L or 4 L/ha) has been found to have little impact on most native species. However some native grasses are susceptible.
- With established perennial grasses, grass selective herbicides must be applied when the plant is actively growing but before boot stage.

Key points

- ❖ Grass weeds are often spread around the landscape by roadside maintenance machinery involved in grading and slashing activities.
- ❖ Invasion of many grasses is often facilitated by fire and loss of canopy cover.
- ❖ Recognising and treating grasses at the appropriate growth stage is integral to a successful outcome of any control program.

It is important to identify unknown grass species and not just assume that because it is a grass it is a weed. There are many grasses native to the Perth region

Developing and implementing a weed management strategy

Weed management in bushland is about the protection and restoration of diverse natural ecosystems.

A **first step** in developing a strategy is gathering information on the distribution of native flora (flora list), the native plant communities (vegetation map), the patterns of disturbance across your bushland patch (vegetation condition map) and then the distribution of the target weed species.

Maps of the target weed are a basic planning tool and allow for careful targeting of limited resources. They also provide the information for costing out a weed management strategy and monitoring success.

As a first priority target small populations of the weed in good condition bushland. Consider the impact of the weed on rare plants or rare plant communities. Contain the spread of larger populations.

Monitor the effectiveness of a weed management program and possible impacts on the native plant community then use the information to guide future management actions (see reference list for information on monitoring methods).

Always have resources available to control grass weeds following fire.

Correct timing is fundamental to successful grass weed control. Develop works programs and organise contractors at the beginning of each year.

Reference and further information:

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➤ Slashing is generally used in conjunction with a herbicide treatment. Tussocks are slashed to the base to remove the bulk of old material and to promote vigorous growth; this should be done during the vegetative phase to maximise the regrowth of leafy green material. When regrowth is lush and vigorous, plants are spot sprayed with the appropriate herbicide.

➤ **Note:** Slashing without follow-up herbicide treatment may increase productivity of some grasses. This appears to be true of Love Grass in the Perth region.

The Perennial Tussock Forming Grass Weeds of the Jarrah Forest and Swan Coastal Plain: biology, management and control

Species	Common name	Photosynthetic pathway	Growing season	Flowering	Reproductive unit	Dispersal agent	Seedbank persistence (years)	Fire response	Suggested methods of management and control
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	C3	win-spr	spr-sum	seed, rhizomes	water, wind, bird, mammal, slash	short-med-long?	resprouts	Cut out plants, ensure rhizomes are removed; spray with grass selective herbicide in winter/spring. Follow-up with seedling control.
<i>Cenchrus ciliaris</i>	Buffel Grass	C4	spr-aut	opportunistic	seed, short rhizome	wind, mammal, water, bird	5+	resprouts, stimulates seed production	Cut out small populations, entire plants with dormant buds must be removed; spray with Verdict® 8L/ha + wetting agent. Follow-up with seedling control.
<i>Cortaderia selloana</i>	Pampas Grass	C3	win-sum	opportunistic	seed, rhizome	wind, water, slash, mammal	2	resprouts	Cut out small plants, do not leave uprooted plants lying on ground - they can resprout; remove flower heads - slash/burn clumps and spray regrowth with 1 % glyphosate. Treat young plants with 0.5 % Fusilade® plus spray oil. May require more than one application.
<i>Dactylis glomerata</i>	Cocksfoot	C3	variable	spr-sum	seed, tillers	water, animal, slash,	1-4+	resprouts, increases	Cut out plants; slash/burn clumps and spray regrowth with glyphosate 1 %. Follow-up with seedling control over following years.
<i>Ehrharta calycina</i>	Perennial Veldgrass	C3	cooler months	spr (2 flushes)	seed, short rhizome	water, wind, bird, mammal, slash	short-med	resprouts, enhances seed production and germination	Cut out - ensure crown removal; spray with Fusilade® 8 mL/L (4L/ha) + wetting agent - follow-up in subsequent years; utilise unplanned fires and spray regrowth and seedlings within 4-6 weeks of resprouting or germination. Do not slash.
<i>Ehrharta erecta</i>	Panic Veldgrass	C3	slows in hot conditions	spr-sum (all year)	seed, short rhizome	water, wind, bird, slash	short 1yr/long lived?	resprouts, enhances seed production and germination	Cut out small populations removing all rhizomes; spray with Fusilade®; utilise unplanned fires and spray regrowth and seedlings within 4-6 weeks
<i>Eragrostis curvula</i>	African Lovegrass	C4	warmer months	opportunistic	seed	water, wind, mammal, slash		resprouts	Cut out small plants; spray with 1 % glyphosate; utilise unplanned fires and spray regrowth at 5-10 cm. Always requires follow-up treatment.
<i>Holcus lanatus</i>	Yorkshire Fog	C3	win-spr	spr-sum	seed	wind, water, mammal	4+		Spray glyphosate 0.5 %
<i>Hyparrhenia hirta</i>	Tambookie Grass	C4	warmer months	sum	erratic seeder, tiller	roadside maintenance machinery, water, wind		Resprouts	Cut out small populations - ensure tiller bud removal; Spot spray larger infestations with 3 % glyphosate + 2mL/L spraytech oil when actively growing (between November and March) or slash in spring and spot spray regrowth when 15cm high with glyphosate + spraytech oil. A number of treatments may be required within the one year. Spray seedlings at 5 leaf stage with Fusilade® at 20 mL/10 L (1L/ha) + penetrant.
<i>Melinis repens</i>	Natal Redtop	C4	warmer months	sum	seed				Cut out small populations. Spray 8 mL/L (2-4L/ha) Fusilade® + wetting agent.
<i>Paspalum dilatatum</i>	Paspalum	C4	late spr-early aut	sum	seed, short rhizome	animal, water, wind			Cut out small populations - ensure rhizome removal; spray with grass selective herbicide or cut near ground level and immediately wipe with 10 % glyphosate or spray adult plants10 mL/L Fusilade + wetting agent. Follow-up seedling control - spray 1 mL/L Fusilade® + wetting agent.
<i>Paspalum urvillei</i>	Vasey Grass	C4	spr-aut	spr-sum	seed				Cut out small populations - ensure rhizome removal; slash and spray regrowth with grass selective herbicide or 1 % glyphosate. Follow-up seedling control - spray 10 mL/L Fusilade® + wetting agent.
<i>Pennisetum macrourum</i>	African Feather Grass	C4	spr-aut	sum	seed, rhizomes, tillers	water, wind		resprouts	Dig out small infestations; slash winter and/or spray with glyphosate 1 % + penetrant in spring to autumn. Follow up treatment until regrowth ceases - follow-up seedling control.
<i>Pennisetum purpureum</i>	Elephant Grass	C4	spr-aut	spr-sum	rhizomes, tillers, seed?	wind, water, bird	viable seed?	Resprouts	Dig out small infestations; slash winter and/or spray with glyphosate 1 % + penetrant in spring to autumn. Follow up treatment until regrowth ceases - follow-up seedling control.
<i>Pennisetum setaceum</i>	Fountain Grass	C4	spr-aut	spr-sum	seed	wind, water, mammal, slash	6+	resprouts	Dig out small infestations; slash winter and/or spray with glyphosate 2 % + penetrant in spring or when actively growing. Follow up treatment until regrowth ceases - follow-up seedling control.
<i>Pentaschistis pallida</i>	Pussy Tail	C3	win	spr	seed	wind, ant			Prevent seed set - cut out or spray with grass selective herbicide.
<i>Piptatherum miliaceum</i>	Rice Millet	C3	win-spr	spr-sum	seed	mammal, wind, water			Cut out young plants, slash larger clumps and spot spray with glyphosate.
<i>Rostraria pumilla</i>	Rough Cat's tail	C3	win	spr					
<i>Sporobolus africanus</i>	Paramatta Grass	C4	spr-sum	late spr-sum	seed	wind, water, mammal		resprouts	Cut and bag seed head then dig out; Slash large clumps in winter/spring and spray regrowth with glyphosate at label rates (summer/autumn).
<i>Tribolium uniolae</i>	Tribolium	C3	spr	spr-sum	seed, short rhizome	water, wind, ant		resprouts	Spot spray with glyphosate 10 mL/L or Fusilade® 12 mL/L + wetting agent prior to boot stage. Spot spray resprouting clumps and blanket spray seedling flushes with Fusilade® 10 mL/L + wetting agent.

Photosynthetic pathway: C3 = cool season grass, C4 = warm season grass.
Growing season: usual period of active growth. Flowering: period over which grass flowers. Seedbank persistence : length of seed viability in years (where known)

Tambookie Grass or Coolatai Grass (*Hyparrhenia hirta*), Love Grass (*Eragrostis curvula*), Perennial Veldgrass (*Ehrharta calycina*)

Some general biology

- ❖ Tussock forming perennial grasses often resprout following slashing or fire
- ❖ Old plants carry high fuel loads. Each year new stems and leaves are produced and the older ones accumulate on the plant as dead material
- ❖ These grasses increase in native bushland following fire or soil disturbance

Impacts

- ❖ Perennial tussock forming grasses form large dense clumps that suppress and displace native flora particularly native herbs and grasses
- ❖ They change intensity, seasonality, patchiness and frequency of fires in bushland impacting on the canopy structure and on the diversity of flora and fauna

Tambookie or Coolatai Grass

Some interesting biology

- C4 grass so period of most active growth is warmer months - spring and summer.
- It has wide soil tolerance, including dry, hard, rocky soils and deep dry sands.
- The seed is spread by road maintenance machinery involved in slashing and mowing along road sides, in water flow and runoff into bushland and in the fur and coats of stock and on the clothing of humans.

Where does it grow?

Tambookie Grass is native to tropical, eastern and southern Africa, and the Mediterranean Region where it occurs in open savannahs. It also occurs naturally from Iran to India.

In Western Australia Tambookie grass grows from Geraldton around to Esperance and can be found on a range of soil types spreading along road verges and railway lines into adjacent bushland.



Tambookie or Coolatai Grass (*Hyparrhenia hirta*)

Love Grass

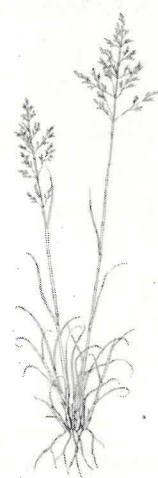
Some interesting biology

- C4 grass so most active period of growth and flowering is through the warmer months but in the Perth area will flower any time after rain.
- Generally a weed of highly disturbed edges but will move into otherwise undisturbed bushland following fire or soil disturbance.
- Ripe seed is present generally between January and March but can be present at other times.
- Seeds germinate in autumn or spring if sufficient moisture is available.
- The seed is small and light and moves short distances in the wind.
- Seed is mainly spread as a contaminant of soil and gravel used in road making. It is also spread by road maintenance machinery involved in slashing and mowing along roadsides, in water flow and runoff into bushland and on the feet and in the coats of animals.

Where does it grow?

African Lovegrass is native to Southern Africa where it grows in high rainfall areas on sandy to loamy soils.

In Western Australia African Lovegrass occurs from Carnarvon around to the Nullarbor on road verges, disturbed ground and in adjacent bushland.



African Lovegrass (*Eragrostis curvula*)

Perennial Veldgrass

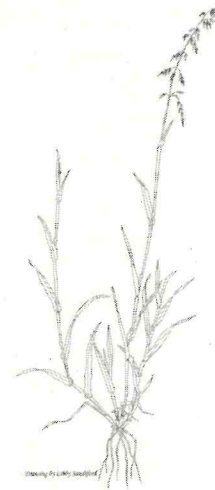
Some interesting biology

- Plants grows actively over winter and spring going into dormancy over summer.
- Highly invasive on sandy soils in bushland on the Swan Coastal Plain particularly after fire.
- Invasion into bushland can be associated with loss of tree canopy cover and an increase in available soil nitrogen that often follows fire.
- Flowering occurs in spring.
- Ripe seed is present on plants between October and January.
- Fire enhances seed production.
- Up to 75000 seed m² in recently burnt areas of Banksia Woodland.
- Seed can germinate any time of the year following rainfall.

Where does it grow?

Perennial Veldgrass is native to Southern Africa where it occurs in many habitats on a range of soil types.

In Western Australia it is a wide spread weed of roadsides and bushlands from Geraldton around to Esperance particularly on the sandier soils.



Perennial Veldgrass (*Ehrharta calycina*)